# RANGE OPERATION CENTER (ROC) – Large

Representative ROC-Large Photo

Function: The ROC-Large houses the range control stations (RCS), data termination racks (DTR), communication racks, instrumentation equipment, communications equipment, heating/ventilation/air conditioning (HVAC), as well as providing accommodations for range personnel. All targetry and scenario-driven training is controlled from this facility. The ROC-Large is the central communications hub for all cabling systems downrange, the cantonment area, and installation connections.

General: The Range Operations Center - Large (ROC-Large) provides office space, a breakroom, and storage for personnel conducting training exercises, as well as an observation room for viewing downrange training exercises either by line-of-sight or camera video as well as a real-time view of the range scenario control computers. Space is also provided in the communication room for required electronics and communications equipment. A mechanical/electrical room is provided for HVAC, panelboards, and other equipment. The ROC-Large shall be positioned near the baseline if possible to provide the observation room with the most allowable view of downrange exercises that the topography permits. When line-of-sight is not possible, the ROC-Large shall be completely camera dependent for observation of the training area with equipment provided by the Other Appropriations-Army (OPA) contractor. The control room is the heart of downrange operation scenario control. Observation windows can be provided in the corridor and observation room to help reduce unwanted traffic in the control room area. The ROC-Large shall be designed with deep roof overhangs and pull-down shades to reduce solar glare. All windows in the ROC-Large are to be a fixed type and insulated. The range flagpole shall have a red “range is hot” light atop the pole that can be switched on or off from the ROC- Large.

Design Drawings: See the ROCA Details in the Appendix of this document.

Siting Criteria: The ROC-Large shall be located approximately 15 to 50 meters behind the baseline in an area offering an unobstructed view of all of the baseline and visibility of as much of the downrange area that is economically practical. The console operator should have an unobstructed view of the firing line and downrange firing positions either by line-of-sight or camera video coverage.

Typical Configuration:

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| Size: | 185.8 square meters (2000 square feet) |
| Occupancy: | 20 |
| Foundation: | Concrete slab on-grade with turned-down edges |
| Shell: | Reinforced, split-faced CMU |
| Roof: | Insulated Standing Seam Metal Roof (SSMR) system |
| Doors: | Insulated hollow metal |
| Windows: | Aluminum frame with polycarbonate glazing |
| Interior Finishes: | Painted CMU, acoustical tile ceiling, sheetrock/metal studs |
| HVAC: | Central heat and air - site adapted. Dedicated system for communications room with emergency shut-off capabilities |
| Standard Lighting: | Fluorescent |
| Special Lighting: | Red lenses or red lamps |
| Lightning Protection: | Roof mounted air terminals |
| Power: | 120/240VAC, single phase, 3-wire secondary |
| Telephone: | Standard Voice Cable (optional) |
| Installation Network Connection: | Fiber Optic Cable (optional) |

Electrical/Communications: This section discusses electrical/communication considerations unique to this specific structure type. Downrange power, communication, load, transformers, trenching requirements, etc., are discussed elsewhere in this manual.

Electrical Service: Electrical service to the ROC-Large shall be 120/240Volt, single phase, 3-wire secondary; 277/480Volt, three phase, 4-wire; or 120/208Volt, three phase, 4-wire secondary. The voltage supplied must be maintained within 5 percent at a frequency of 60 Hz, +/-0.5. Surge suppression devices shall be provided at the service entrance for protection of the ROC-Large distribution system. Rigid steel conduit shall extend a minimum of 1524mm (5 feet) beyond the outside of the building foundation for power circuits entering or leaving the building. The raised computer floor in the communications and control room must maintain a minimum depth of 305mm (12in) and form an interconnecting pathway between the communications and control rooms. The ROC- Large power distribution panel shall have separate circuits for lighting, convenience outlets, communications, and HVAC equipment.

Additionally, two dedicated 120 V, 20A duplex receptacles outlets on separate circuits should be provided in the base of each communications rack and DTR.

A separate power distribution panel shall be provided for the communications equipment installed in the Communications Room. A mushroom type button shall be provided at the door of the Communications Room. This button shall allow for the HVAC to the room the shutoff and disconnect the power feeding all communications equipment in this room.

A UPS will be provided and installed by others and installed in the Communications Room. The weight load of the UPS shall be considered when providing the raised floor in the Communications Room. A manual transfer scheme consisting of a double-throw safety switch and a separate UPS disconnect switch shall be provided in the design to allow for simple installation of the UPS by others and allow for a bypass circuit to utility power.

Lighting: Fluorescent lighting shall be used. Red lamps or lenses for night operation shall be provided with protected switching to prevent accidental illumination of white lights during night operations. The control room requires a lighting system with dimming capabilities. Where necessary, low-level in-ground lights (similar to airfield markers), may be used for vehicle parking areas and walkways. There is not an Army standard for the lighting system. The designer must ensure that the customer's lighting requirements are met.

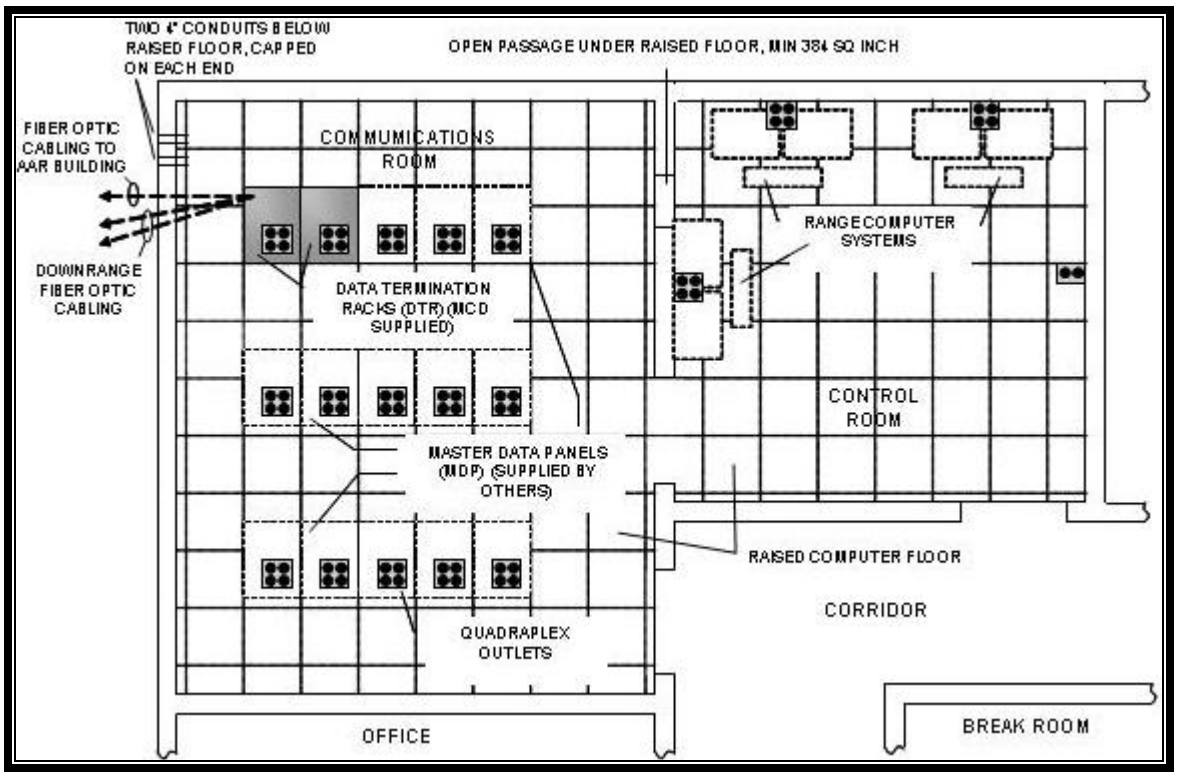
Night Operations Lighting: To prevent interference with specialized equipment used during night operations, red lenses or red lamps must be provided in addition to standard lighting if the following conditions exist.

- Night training will be performed
- ROCA buildings are near the firing positions
- ROCA building has windows that cannot be covered.

Separate switching for the standard and red lighting shall also be provided, located near points of egress.

Grounding: Grounding is required for safety and for lightning protection. The ROC-Large ground system shall consist of a buried, No. 4/0 AWG, stranded, copper conductor and ground rods all interconnected to yield an earth resistance of 25 ohms or less. Cable connections and connections to the ground rods and structural steel shall be exothermically welded. The DTR and communication rack ground points shall be connected to a Single Ground Point (SGP) with a minimum No.6 AWG, insulated, stranded, copper cable. The SGP shall be connected to the ground system with at least a No. 4/0 AWG, bare, copper cable. Any additional DTRs or communication racks shall be bonded together with the same type and size copper ground.

Communication-Targetry Control: The ROC-Large is the main communications hub for all facility cabling. Downrange targets shall be connected to the Data Termination Rack (DTR) with direct burial fiber optic cabling via conduit ductbank at the ROC-Large filled with innerduct to facilitate future expansion. The DTR is an enclosed equipment rack where all fiber optic cables are terminated in a cross-connect panel with industry standard type SC connectors. The actual number of instrumentation racks will vary depending upon the range type and design. The raised computer floor in the communications and control room must maintain a minimum depth of 305mm (12in) and form an interconnecting pathway between the communications and control rooms. Rigid Steel Conduit (RGS) shall extend a minimum of 1524mm (5ft) beyond the outside of the building foundation for communication cabling entering or leaving the building.




Representative ROC-Large Communication/Control Room (Not to Scale)

A minimum 24-strand fiber optic connection is required between the ROC-Large and the AAR-Large for transporting video and data information. All fiber connections made in the ROC-Large will utilize the SC-form connectors.

Other Procurement-Army (OPA) funded communications equipment, including the MDP, can share DTR rack space to convert the fiber optic cables to industry standard. Ethernet copper network cable may be used for connections with the Range Control System (RCS) for targetry control, as well as in combination with other instrumentation requirements. The target/command and control system shall be

Ethernet-based. There should be coordination between the OPA contractor and MCD contractor to determine instrumentation requirements for displaying scenario video in the observation room.

Environmental: The environmental conditions for the communications room shall be: Operational environment of +23.3$^{o}$C (74$^{o}$F) +/- 2.25$^{o}$C (4$^{o}$F); non-operational environment of -34.44$^{o}$C (-30$^{o}$F) to +65.56$^{o}$C (+150$^{o}$F). Humidity should be between 10% - 80% RH non-condensing. Environmental requirements for personnel comfort shall be in accordance with UFC 3-410-01FA.

Telephone/Network Communication: Telephone communications and an installation network connection are not required; if these communications are desired, they must be coordinated with the local installation Directorate of Information Management (DOIM).